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KING'S PARK AS AN INDIGENOUS PARK A NATURAL HISTORY APPRAISAL

BY A COMMITTEE OF THE WESTERN AUSTRALIAN
NATURALISTS' CLUB*

The magnificent statue of Forrest by Bertram Mackennal looks down from the Park which he reserved for the people for all time, and which succeeding generations have done, and are still doing, their best to desecrate. Of the Park, Forrest said: "This will enable the children a thousand years hence, to see what the bush was like when Stirling came here to found a City." But unless something is done the despoilers of this or some future generation will endeavour to filch the people's heritage for purposes that Forrest would never have permitted.

—VICTOR COURTNEY, *All I May Tell*, p. 39

The idea has grown in the mind of the public that it should be preserved to depict Western Australian bushland, and I consider that that is how the administrators of the park should look at the position with a far-seeing eye. To allow our King's Park to be used for any purpose other than that of a park, would be to set a precedent which would culminate in its beauty being destroyed. . . . To my mind, members of this Parliament have a sacred trust to hold King's Park in its natural state, intact for posterity.

—S. E. LAPHAM, M.L.A., *Parliamentary Debates*, 1954, p. 3004.

I think the [King's Park] Board should have an indication from the supreme authority in Western Australia that we know what we do not want done to King's Park. . . . I am firmly convinced that, unless we take a stand in the matter, within the next half century King's Park will be unrecognisable as we know it today.

—Hon. A. F. WATTS, M.L.A., *Parliamentary Debates*, 1954, p. 3270.

1. INTRODUCTION

The nucleus of King's Park had its being in 1871 when Governor Weld approved of an area of 432 acres of natural woodland on Mt. Eliza being set aside "for the purpose of a Public Park and Recreation Ground." In 1890 Sir John Forrest added 548 acres and, with later rectifications, the "Perth Park," to give it its earlier name, comprised about 1,000 acres. Of this most remains today as native bushland.

There appears to have been some initial uncertainty as to how this large parkland should be developed for the enjoyment of the community. In 1892 the Government granted an area to Hale School as playing fields in exchange for the school's original grounds which were sought for the new Observatory about to be built. In

*Conveners, A. R. Main and D. L. Serventy.

1897 a grant to the Polo Club of Western Australia of 12 acres in the Park was considered, but the proposal was not gone on with. The Mount Tennis Club in 1899, however, was granted a tenancy in the Park and this was followed by a similar privilege to the King's Park Bowling Club in 1903. Since then further inroads into the Park for such purposes have ceased, and it came to be accepted that the future of the Park should be substantially as a bushland reserve.

Sir Malcolm Fraser, who had been instrumental in the initial moves for the establishment of the Park in 1871, wrote in the *Western Australian Year-Book for 1902-04*, p. 1126: "Everything has been done to preserve the native trees and flora, so that the wild flowers and shrubs are a delightful feature of the Park." Sir John Forrest's views are set out at the head of this article. His dream of a "sanctuary of bush land right in the heart of the City" was a reality to the early Boards, as may be witnessed by their management policies. In the 54 years which have elapsed since the tenancy of the tennis courts was granted in 1903 the successive Boards have resolutely refused any similar or other encroachment on the bushland areas. The widow of one of the first members, Mrs. D. Temple-Poole, wrote in the *West Australian* of October 26, 1954: "As the wife of one of the original members of the King's Park Board I wish to state that Lord Forrest, Sir Winthrop Hackett, Mr. G. Temple-Poole and Mr. A. Lovekin had one thought in mind—to preserve for all time [in the] heart of the city . . . a priceless possession . . . an indigenous park."

This policy of an indigenous park quickly crystallised into a tradition. Official tourist literature proudly publicised it as a unique character of an Australian park. Mrs. Emily H. Pelloe (1921, p. 19), in her first wildflower book, wrote: "Residents of Perth are fortunate in the possession of King's Park [which] except for small portions near the various entrance gates . . . is virgin bush, and very many of the wildflowers native to Western Australia may be seen growing there in their natural state. . . . To be able to walk or ride through still scrub-tangled flowery glades shaded by great trees, within a mile and a half of the heart of their capital city, is a joy West Australians should truly appreciate." But, unhappily, the existence of such a block of apparently unused bush, publicly owned, and therefore available for pillage, was a constant temptation to persons and organizations seeking cheap sites for hospitals, rose gardens, swimming pools, and other purposes. One such attempt of 30 years ago is worth recalling because of the nature of the reaction it provoked from civic and political leaders of the day.

In February, 1927, the Government appointed a committee, under the chairmanship of J. B. Hawkins, to inquire into the hospital needs of the metropolitan area. In its report, published in the *West Australian*, June 24, 1927, it recommended: "Upon mature consideration . . . your committee has come to the unanimous conclusion that the only site that would adequately meet the situa-

tion is a portion of King's Park.* Your committee, therefore, recommends the allocation of an area of 35 acres, with a frontage to Thomas Street." The luckless suggestion brought a hornets' nest about the ears of the committee. Sir Hal Colebatch, just returned from London after a term as Agent-General, wrote in the *West Australian* of June 25:

"If I were forced to admit that there is no adequate and suitably situated space available (in the sense of its being still public property) I would still contend that it would pay us far better to resume the required area—much after all would mean the acquisition by the State of an appreciating asset—rather than to take away 3 per cent of the best of our parks for a purpose which, though amongst the noblest of a people's activities, is not the purpose for which it was set apart. May I suggest to the committee that it is easy to pick upon King's Park as the one entirely suitable spot for a hundred different and worthy purposes; and to the Government that the report be referred back to the committee with an intimation that the public parks and reserves of the city are not available as hospital sites."

The same issue of the *West Australian* reports the monthly meeting of the W.A. Naturalists' Club at which a motion of protest was passed. During its discussion Mr. L. Glauert doubted whether the King's Park Board would ever entertain the proposal. "He recalled the firm way in which the board had turned down a similar request from the University, though the latter had put up a very strong case."

The *West Australian* on June 26 was most outspoken. In its editorial it thundered:

"Admittedly the difficulty of obtaining a suitable site . . . is not easy to overcome. Evidently the committee of investigation so found it, or its members would never have been audacious enough to recommend the laying of covetous hands on 35 acres of King's Park. That recommendation does such violence to popular sentiment and so flagrantly disregards the people's frequently expressed antagonism to the alienation, no matter for what purpose, of even an acre or two of this national domain, next to the Swan River, the City's proudest natural possession, as to debar it from serious consideration."

The Perth City Council, at its meeting on June 27, hastened to condemn the proposal and passed a resolution that:

"It is of the highest importance in the interests of the people of this city, and in fact of the State of Western Australia, that King's Park shall be retained intact for the use of the people for ever."

The Premier (the late P. Collier), in expressing his surprise at the suggestion being put forward, stated:

"I want to make it clear that the Government will not allow any further infringement of the park area. . . . King's Park is for the people, and must be preserved intact. The policy of the Government is 'Hands off' and no further encroachment will be permitted."

The proposal died.

As the years passed recollections became dim, in certain quarters, of the founders' ideas and of the resolve of their immediate successors to safeguard the park. In 1946 came a more determined threat in a plan to establish a memorial rose garden there;

* Note how this insistence on King's Park as the "only" and "adequate" site closely parallels the present demand for an Aquatic Centre.

its advocates were more persistent than the hospital protagonists of 20 years previously, but again the suggestion failed to materialise.

The earlier King's Park Boards sturdily defended the traditional character of the Park. Over 10 years ago the Superintendent-Secretary of the Board (Mr. J. E. Watson) reaffirmed the policy in a report in the *West Australian* of September 12, 1946:

"Mr. Watson said that the fame of King's Park rested largely in natural bush so close to the heart of the city . . . The policy of the Board is based to a large extent on the following principles: (1) Preservation of the existing area against any type of alienation . . . (3) Preservation of all the remainder of the bush portion of the park in its natural state, except in certain portions that lend themselves to such treatment to introduce other West Australian flora."

However, new men came to be appointed to the King's Park Board. Some were not "native sons"; they were reared in other environments, and had other, overseas, standards of what constituted woodland beauty. Understandably enough, perhaps, they saw in the old tradition of a bushland reserve an impediment to "progress." This attitude was pithily expressed by a correspondent to the *Perth Daily News* of July 18, 1956, who, attacking the old tradition, complained that "King's Park is like an Indian sacred cow—it's so holy that it can't be touched in any circumstances . . ." He left it in no doubt that this "sacred cow" offended him, the bush was repellent and he would rather have it as lawns and ordered gardens.

Public disquiet at the extent to which these views were infiltrating in some official quarters erupted in 1954 when it was announced that the Perth City Council desired to possess itself of 20 acres of bushland in King's Park, lying in the angle between King's Park Road and Thomas Street, to construct an aquatic centre, of which an Olympic Pool for competitive events was to be the prime feature. Though 30 years previously it had opposed, with great indignation, the erection of the Perth Hospital in the Park, the Council so far retreated from its belief at the time, "that King's Park shall be retained intact for the use of the people for ever," that it was now prepared to wrest ground for itself for a much less worthy purpose. A lively public controversy followed, in which the Women's Service Guilds (led by Mrs. B. M. Rischbieth) deserve great credit for rallying public opinion to defend the traditional character of the Park. As a result of the feelings aroused Parliament passed an act, introduced by Mr. S. E. Lapham, M.L.A., to prevent the King's Park Board from taking any independent action which might imperil the Park as popularly regarded and revered. Specifically, the Board was forbidden to erect an aquatic centre or orchestral shell without the consent of Parliament. The Legislative Council added further teeth to the restraints on the Board by forbidding it to erect any structures in the Park, where an admission price would be charged, if such developments involved the despoliation of native flora.

Notwithstanding the decisive vote against the Aquatic Pool proposals and the firm opposition of most members of Parliament

to changes in the traditional view of Park management, the Perth City Council, led by the Lord Mayor (Mr. H. R. Howard), with rather puzzling obstinacy persisted in its attempts to procure the 20 acres of ground. Though there was never any indication in the interim that Parliament would change its views on the matter great expense was incurred for the ratepayers in the preparation of plans for a Park site for the Pool and costly propaganda brochures, apart from time lost in not considering alternative sites. The scheme is now again being presented to Parliament, and a second defeat appears inevitable.

This Club is not concerned with the peculiar problems of bathing pool sites. It may, however, be remarked in passing that it is strange that so-called hard-headed businessmen should consider it a worthwhile proposition to build a pool in a neighbourhood lavishly supplied by natural swimming facilities, all available gratis. There are unrivalled estuary beaches on the Swan River to the south and surf beaches on the ocean front extending for many miles. Furthermore, an Olympic Pool is projected at Lake Claremont (Butler's Swamp), less than 4 miles away. The obvious site for a pool, if it is desired to serve as a real amenity to the public and earn assured revenue, is in the thickly populated eastern and south-eastern suburbs where adequate bathing facilities are at present lacking.*

The primary concern of the Club, however, is not the Pool but the safeguarding of the natural bushland which is the core of the Park as we now know it. It is most satisfying to read in *Hansard* of 1954 the speeches in the Legislative Assembly and the Legislative Council from member after member, of all political parties, defending the traditional concept of the Park as a symbol of a young country's pride in the beauties of the natural environment in which its people were nurtured. The Hon. A. F. Watts, in a powerful speech (an excerpt of which is quoted at the head of this article) condemned those who sought portions of the park for Olympic Pools and other constructions as "people who suffer from a kind of spiritual vandalism." The Hon. J. D. Teahan, in the Legislative Council, typified the feelings of many when he described the exhilaration of one who was country-bred and learned to love the bush since his boyhood at driving through such a park so close to the heart of the city. "We should admire," he said, "these persons who in earlier days . . . reserved King's Park as a quiet spot in a busy city."

Yet amidst these expressions of fervent appreciation of the bushland areas of the Park there were discordant voices who were undisguised in their expression of distaste for the Australian bush. There were only a few but it was disconcerting to find among them two Ministers of the Crown. The Hon. E. K. Hoar (Minister for Lands) surprised the House by declaring that "if there is anything beautiful in the park, it is not what has been created by nature,

* An illuminating discussion of this and associated problems is given by Molly Calder in "The Real King's Park Question," *The Municipal and Road Board Gazette*, June, 1957, pp. 19-21.

but that which has been done by the King's Park Board" and the tennis and bowling clubs. He must have been perplexed, therefore, at what it was that Sir Malcolm Fraser and Sir John Forrest saw in the area originally to wish to preserve it. The Hon. H. C. Strickland (Minister for the North-West) said: "I see no beauty at all in the banksia and scrub. . . I believe that King's Park is an area which is now too large to be preserved as just plain bush." And the Hon. N. E. Baxter: "All we see there is the poor dismal Australian bush." These critics all admired the artificial beauty of the "improved parts" of the Park, and no doubt would have endorsed the dream of the Lord Mayor (Mr. Howard) who has written: "Hyde Park, London, St. James' Park and Kensington Gardens have all been developed in a way which ultimately we sincerely hope King's Park will develop" (*in litt.* to Mr. N. Atkinson, Leederville, April 12, 1957).

An explanation of this depreciatory attitude was given by Mr. L. C. Nimmo, M.L.A., who said in the Assembly: "It is significant that the ones who are anxious to tear out the natural bushland in King's Park are people who, though they may be of the same blood as we were, were born in some place overseas. By virtue of the land of their birth, they have not that inherent love that the natural-born Australian has of the bushland." There is a lot of truth in this but it is not an all-embracing generalisation. Many overseas people do in fact fall at first acquaintance under the subtle spell of the Australian bushland; others, repelled at first, succumb later to its lure; others again, unhappily for them and for us, never do. On the other hand there are some native-born Australians who remain quite indifferent to the appeal of the Australian bush. Were it otherwise there would be little need for the recent formation of the Tree Society.

Nevertheless, Mr. Nimmo is more right than wrong. The very same sentiments were expressed many years ago by the late Frank Tate, a distinguished Director of Education in Victoria, in his introduction to Dr. J. A. Leach's *An Australian Bird Book* (1911, p. 1). He wrote:

"Nature-study in our schools is fast producing a generation of Australians trained to look upon the characteristic beauties of our Australian skies, our trees, our flowers, our birds with a passionate appreciation almost unknown to our pioneering fathers and mothers. It was natural that newcomers from the Old World should have been impressed, and often unfavourably impressed, by the oddness of things here. Rural sights to them had hitherto been sights of trim meadows bordered by neat hedgerows, of well-cultivated fields . . . fair gardens and far-reaching parks of magnificently-spreading trees. What wonder, then, that they were at first almost repelled by the strangeness and unfamiliarity of their new surroundings! How could eyes accustomed to the decided greens and to the somewhat monotonous shapeliness of the trees in an English summer landscape find beauty all at once in the delicate, elusive tints of the gum trees, or in the wonderfully decorative lines of their scanty boughs and light foliage shown clear against a bright sky? And so a land which is eminently a land of colour, where the ever-present eucalypts give in their leaves every shade from blue-greys to darkest greens; where the tender shoots show brilliantly in bright crimson, or duller russets, or bright coppery-gold; and where tall, slender stems change slowly through a harmony of salmon-pinks and pearl-greys, has been called a drab-coloured land."

In the following pages we endeavour to show that King's Park, representing one small segment of our Western Australian scenery associated with our historical beginnings as a State, contains a wealth of natural history interest as well, and abundantly justifies our legislators' desires to maintain it for posterity. There are problems associated with its preservation admittedly, but it should not be beyond the wit of man to overcome them. In Section 6 we discuss some of the problems and offer suggestions for tackling them. But it must be remembered that what we are all concerned about is to get results quickly, to accelerate or short-circuit nature's own cures. It is worth pondering on, however, that if Perth and King's Park were abandoned tomorrow the cleared and disturbed areas would all revert in time, and not many years at that, as most farmers know, back to the original bush!

2. THE PHYSICAL ENVIRONMENT

The rocks of the Swan Coastal Plain on which Perth stands are sediments of several kinds derived from diverse sources. To the east, adjacent to the Darling Range and derived from the high land, are the clays which are so characteristic of Guildford and Armadale. West of the clays occurs a belt of sands which at present contain mostly quartz grains. These are leached, the soluble minerals have been removed by solution leaving only the insoluble silica. An entirely different sort of sand occurs to the west of the siliceous sands; these are the calcareous sands which form the Coastal Limestone, the highest land on the Coastal Plain.

The Coastal Limestone originated at a time of lowered sea-level during the last Ice Age when strong winds raised immense dunes of beach sand and shell fragments. Later water from rain soakage through the dunes dissolved some of the lime in the shell fragments and then deposited it again as a "mortar" binding the sand into a "limestone" as we now see it. However, the evidence of the old dune structure is still preserved for us in the riverside cliffs of Mt. Eliza where the so-called false or cross-bedding characteristics of dunes are clearly seen.

The rock sequences discussed above do not meet along straight lines of contact, rather adjacent rocks interfinger one with the other. Thus in King's Park one finds the most easterly in the whole Coastal Plain of the old Ice Age dunes. This is Mt. Eliza. In the valleys between the dunes are the quartz sands which continue to the east as the sole soil type in the area between the limestone dunes and the clay (this last is a zone which does not occur within the park).

The geological history of the area, as discussed briefly above, influences the natural history and certain plants and animals prefer, or occur exclusively on, one or the other of the geological formations. The study of the reasons why some plants or animals occur in restricted places or at restricted times is part of the science of ecology. When an assemblage of plants is found to occur always together such an assemblage is technically termed an "association,"

and is named according to the most conspicuous plant in the assemblage, as discussed in the section which follows.

3. THE FLORA

Botanically the land comprising King's Park is typical of the virgin land which has been, and is being completely destroyed in the development of Perth and its suburbs. As such its retention in the natural state is of inestimable value to the scientific worker.

The vegetation of the area falls into two fairly distinct types, the deep sand on which Jarrah and Banksia are the predominant trees, and the limestone soils carrying Tuart. This latter vegetation type, the Tuart association, occupies a narrow belt of country skirting the river and extending inland as far as the water reserve. The vegetation here has suffered to a certain extent by the planting of grass and formal garden beds overlooking the river and the City of Perth. The bulk of the Park, however, consists of the Jarrah and Banksia association, with its assemblage of various shrubs.

TUART ASSOCIATION

The Tuart association as it occurs in the Park is typical of the mixed assemblage which characterises the northern portion of its range, and is very different from the pure parkland type which is found in the Bunbury-Busselton area.

The Tuart (*Eucalyptus gomphocephala*) with its grey persistent bark is readily identified, and some very large trees can be seen. Scattered specimens of Jarrah (*Euc. marginata*) occur with the Tuart, particularly in the yellow sand away from the outcropping limestone, while Shcoak (*Casuarina Fraseriana*) and Banksia (*B. Menziesii* and *B. attenuata*) make up the second story of trees.

The dark green cypress-like tree which is prominent on the slopes above Mount's Bay Road is the Rottnest Island Pine (*Callitris Preissii*). At one time this plant was fairly common around the Swan River, but is now becoming scarce except for a few patches on riverside reserves including the Park.

Below the trees are the shrubs, some of which are characteristic of the environment. Most interesting among the taller shrubs is *Dodonaea Haekettiana*, a shrub of 10-12 ft. originally described by Mr. W. V. Fitzgerald in 1905 from a plant growing within a few yards of the spot where the War Memorial now stands. As far as is known this species is now largely restricted to King's Park.

Others among the more spectacular or specialised plants of the limestone soils can be listed.

Templetonia retusa, the so-called Cockies' Tongues, is a shrub of 6-8 ft. of compact bushy shape. The red elongated pea flowers are produced in profusion in the early spring.

Grevillea Thelemanniana is a dense shrub with finely divided leaves and red flowers, not very abundant, but making an attractive picture amongst the green leaves.

Melaleuca Huegelii a tall shrub with small leaves, closely pressed to the stems, is prominent on the slopes of Mt. Eliza. In January and February it produces abundant white flowers in a typical "bottle brush" type of flower head.

The Yellow-tail Flower (*Anthoecercis littorea*) was at one time thought to be entirely confined to the coastal limestone. It is a spindly erect shrub, and is actually a mildly poisonous plant. It too is found on the slopes of Mt. Eliza where it is associated with the harsh, prickly-leaved white flowered native lily, *Acanthoearpus Preissii*.

Amongst the limestone outcrops around Mounts Bay Road are several other plants which are not found elsewhere in the park. Principal shrubs are a native Fuchsia, *Eremophila glabra*, and the related *Myoporum insulare*, the blue-flowered *Scaevola nitida*, with its Leschenaultia-like flower so prominent in coastal areas, the aromatic coastal daisy, *Olearia axillaris*, and the white-flowered heath, *Leucopogon Richei*.

JARRAH-BANKSIA ASSOCIATION

The deep sandy soils carrying Jarrah and several species of *Banksia* occupy the greater part of the Park.

Large portions of this vegetation type have already been excised from the park for use by various sporting bodies, and the area occupied by these leases originally supported the richest flora of the park as regards numbers of species. The same species-rich vegetation occurs along King's Park Road to Thomas Street, but



Fig. 1.—*Banksia* woodland near Monash Avenue. *Banksia attenuata* in the middle, with a small Jarrah and a Sheoak to the right.
—Photo A. M. Baird, August, 1955.

the number of species per unit area decreases in the direction of Crawley and the Swan River.*

The character tree of this area of the Park is probably the Jarrah. Generally speaking the specimens of this species are small and stunted, with little resemblance to the giant trees of the forest areas further south. Nevertheless, they are typical of the specimens which occur throughout the coastal belt areas of the species' range.

Associated with the Jarrah, and contributing in no small way to the character of the association, are the five species of *Banksia*. They are comparatively low, branching, grey-barked trees and in the newer suburbs are frequently preserved in home gardens as decorative trees.

The most interesting of the four species is the Silver *Banksia* (*B. prionotes*), with its silver-grey buds and deep orange flowers. It makes an attractive show over the greater part of the year in the vicinity of Thomas Street and King's Park Road. This small colony is the only one of this species left in the metropolitan area which is not growing on private land, and is thus the only area near Perth which could be preserved for posterity.

In January the pure-yellow flowering spikes of *Banksia attenuata* make an attractive picture in all sections of the Park. They remain in evidence until the middle of February when their place is taken by the reddish-coloured spikes of *Banksia Menziesii*. These two species have comparatively narrow leaves, but a fourth species, the Bull *Banksia* (*Banksia grandis*) has broad triangular-lobed leaves and yellow spikes up to 18 in. in length. This and the short-leaved Holly-leaf *Banksia* (*Banksia ilicifolia*) is common in certain localities.

The Sheoak (*Casuarina Fraseriana*) is another tree species of this association. This species is peculiar in that each tree bears flowers of only one sex. The flowers are small and do not possess petals as do normal flowers, but the females are aggregated into a woody cone, while the male flowers are borne at the extremities of the branchlets, giving the tree a rusty appearance during spring. A shrubby species, *Casuarina humilis*, also occurs.

Although not of a tree habit and not as prominent in the association as the species already listed, the unique *Zamia Palm* (*Macrozamia Reidlei*) and Blackboy (*Xanthorrhoea Preissii*) are characteristic plants of the coastal plain. They occur freely in the Park, mainly in the Jarrah area, but also on the limestone soils.

Associated with these species is a large number of shrubs and herbs. The taller shrubs are predominantly of the *Banksia* family

* It is a curious reflection on some King's Park Board members' knowledge of the park they administer that during the Legislative Assembly debate on the Parks and Reserves Act Amendment Bill in November, 1951, Mr. S. Heal, M.L.A., a member of the Board, was able to declare, of this section of the Park: "I am sure that the site selected [for the Aquatic Centre], approximately 15 to 20 acres, has no natural flora growing on it nor could it be regarded as a scene of beauty." (*Parliamentary Debates*, 1951, p. 3273.)

(Proteaceae), the Legume family (Leguminosae) and the Myrtle family (Myrtaceae).

Proteaceae: The outstanding example of the taller shrubs is undoubtedly the Parrot Bush (*Dryandra floribunda*). This species resembles *Banksia ilicifolia* in some respects and has a long flowering period, commencing in May and lasting through to the end of December. *Hakea prostrata* is remarkable for its name, for although in King's Park it is 8-10 ft. tall, it was named from the Albany district where it is prostrate in habit. It is quite common in the Park.

Somewhat less plentiful and more restricted in habitat are the Woolly Bush (*Adenanthos sericea*), with its curious divided leaves and insignificant flowers, Tree Smokebush (*Conospermum triplinervium*), with its mass of pale grey flowers in spring, *Hakea trifurcata*, the curious plant with the two types of leaves, one flat and the other needle-like, and *Grevillea vestita*, a plant which flowers twice in one year. In the vicinity of the water reserve it flowers in May-June, while in the vicinity of Thomas Street and King's Park Road it flowers in the spring.

Leguminosae: Prominent amongst the spring flowers are the several species of wattle (*Acacia*) which are widely distributed. The Black Wattle (*Acacia cyanophylla*) is the largest of these, reaching a height of 10-12 ft., but the most spectacular are the smaller species, principally *Ac. pulchella*, *Ac. heteroclita* and *Ac. Huegelii* which provides a large proportion of the yellow-coloured flowers which are so characteristic of the bush in spring.

The species of *Jacksonia* are long-flowering plants and can be seen in bloom at almost any time of the year. *J. Sternbergiana*



Fig. 2.—Mixed Jarrah and Banksia woodland, near Poole Avenue.
Zamia and flowering Blackboy among Veld grass.

—Photo A. M. Baird, November, 1955.

has a sparse weeping habit, while *J. furcellata* is an erect much-branched spinescent shrub. The *Daviesia* species produce some of the earliest flowers of the season and are remarkable for the triangular pods in which the ripe seeds rattle when shaken. Hence the common name Rattle Pods. There are four species in the Park.

Myrtaceae: Besides the Eucalypts, which have already been mentioned, the Myrtle family is well represented in this association. The Spearwood (*Kunzea cricifolia*) is the plant which was at one time used by the local natives for manufacturing spears, and after which the district of Spearwood was named. It is common in the Park, being most evident in the King's Park Road area.

Any plant which flowers profusely when few others are in bloom is of special interest. The two species of *Calythrix* found in the Park are of this type. The delicate pink blossoms of the Summer Calythrix (*C. Fraseri*) appear in the early spring months and continue until the winter, while the yellow-flowered *C. angulata* blooms during most of this period.

Perhaps the most outstanding shrub of this family, however, is the Swan River Myrtle (*Hypocalymma robustum*). A low spreading shrub of 2-3 ft., this species produces masses of pink blossoms on the woody stems during the spring.

Ground Flora: The majority of the native plants of the Park are small shrubs and herbs, plants which are usually referred to as ground flora. Outstanding among these are the three Native Buttercups, and principally *Hibbertia hypericoides*. The yellow flowers of this species can be seen at nearly all seasons of the year but mainly during winter and spring. The purple of *Hovea trisperma* is a pleasing sight in the winter, while masses of Native Wistaria (*Hardenbergia Comptoniana*) can be seen in certain localities. The Scarlet Runner (*Kennedyia prostrata*), Baeon and Eggs (*Oxylobium capitatum*) and *Bossiaea eriocarpa* add touches of red and brown to the landscape. The native heaths are represented by seven species, the principal ones being *Astroloma pallidum*, Cone Flower (*Conostephium pendulum*) and White Heath (*Leucopogon propinquus*). The Leschenaultia family also provides seven species in the flora, mostly with flowers of a pale blue colour, while several species of both sundews and trigger plants are to be found in season. The Daisy family is well represented mainly by small annuals, but also by the spectacular summer-flowering Tangle Daisy (*Helichrysum cordatum*), a plant which bears some general resemblance to Smokebush.

ORCHIDS

Of particular appeal to most people is the group of plants included in the family Orchidaceae, and commonly referred to as Orchids. No less than 19 species of these are recorded from King's Park. While Orchids are not always obvious to the casual observer, because of their small size, and the habit of some of them of growing in the shelter of shrubs, their popular appeal is such that they are fast disappearing from the Park, through irresponsible

persons pulling out the whole plant, sometimes for home cultivation.

The largest of the group is the common Spider Orchid (*Caladenia Patersoni*), in which the petals end in long tails up to 6 in. in length. The broad base of the petals is white, while the labellum or lip is fringed with long reddish teeth. A smaller reddish-flowered species is *C. pectinata*, while the most attractive are undoubtedly the yellow-flowered Cowslip Orchid (*C. flava*) and the Donkey Orchid (*Diuris longifolia*). These two occur in colonies, particularly in the section of the Park bordering King's Park Road, where they mingle with the pink-flowered *Caladenia latifolia*.

The curious Greenhoods—three species of *Pterostylis*—add a bizarre note to the orchid flora, while the Leek Orchid (*Prasophyllum elatum*) and Mignonette Orchid (*Microlis unifolia*) are quite unlike the usual type of orchid. Other prominent representatives of the group are the Enamel Orchid (*Glossodia brunonis*), Rabbit Orchid (*Caladenia Menziesii*), Hare Orchid (*Leptoceras fimbriata*) and Potato Orchid (*Lyperanthus nigricans*), while the two species of Sun Orchid (*Thelymitra*) are common in restricted areas, particularly in the vicinity of the Crawley Entrance.

It may be of interest to record here that the late Mrs. Emily H. Pelloe, who was a member of council of this Club, the authoress of *Wildflowers of Western Australia* (1921) and *West Australian Orchids* (1930), lived in King's Park Road opposite the area coveted for the Aquatic Centre. She studied the orchids then, as now, growing there and led Club excursions over the area.



Fig. 3.—Jarrah and Sheoak woodland near Poole Avenue. *Pimelea rosea* in flower

—Photo A. M. Baird, November, 1952.

FUNGI

The fungi of King's Park are undoubtedly less evident to the general public than are the flowering plants. Nevertheless, they are probably quite numerous, although they have not been investigated fully.

Perhaps the best known of all fungi are those which produce mushroom-like fruiting bodies and of these several occur in the Park. Gentili (1953) has discussed the five species of *Amanita* recorded. The most abundant is *Amanita Preissii*, a species which occurs in three district forms, all of which are highly toxic. Of the other four species one produces a red fruiting body, and another (*Amanita loricata*) was actually described from a specimen obtained from King's Park in May, 1953. The true mushroom, *Psalliota campestris*, is also to be found.

Of the fungi normally growing on tree trunks, both dead and alive, the Bracket Fungi are outstanding. One of the most common is the thick, rigid, brilliant red *Trametes cinnabarina*, usually occurring on fallen logs, while *Polyporus eucalyptorum* is a much larger grey fungus found principally on Tuart trees. Another Bracket Fungus which is quite common on dead wattles is *Schizophyllum commune*, in which the fruiting bodies resemble delicate white fans. Also on wattles and particularly where the wood is damp are several species of *Mycena*. Among the pathogenic forms the most important is *Sporotrichum destructor*, which attacks and destroys the planted specimens of the Red-flowered Gum (*Eucalyptus ficifolia*). This fungus ruined the famous avenue of these trees along Fraser Avenue and they were replaced by Lemon-scented Gums (*Eucalyptus citriodora*), indigenous to Queensland.

NATURALISED FLORA

Besides the plants which are native to King's Park there are some hundred alien species which have been introduced to the area. Prominent among these is Perennial Veld grass (*Ehrharta calycina*) which has spread so vigorously wherever soil structure has been interfered with, or the tree cover has been destroyed by fire or the cutting of trees for firewood or fire-breaks. Teff grass (*Eragrostis curvula*), Fountain grass (*Pennisetum orientale*) and Red Top (*Rhynchelytrum repens*) although not as well known to the public, are present over a considerable area of the park, and are capable of further spread wherever the ground is broken by digging or by the passage of heavy vehicles. Like most of the other introduced weeds in the Park they are usually confined to such places and tend to disappear when the ground is allowed to recover.

Next to the grasses in abundance are the members of the Iris family. Most important perhaps of these plants is Cape Tulip (*Homeria bryonia*), Australia's most serious noxious weed and poison plant, and one which occurs in several areas in the Park. The most widespread members of this family, however, are the red-flowered *Gladiolus caryophyllaceus* and Guildford grass (*Rom-*

lea rosea), which is particularly prevalent, while species of *Watsonia*, *Freezia* and *Ixia* are to be found in many spots.

The Carnation family is well represented among the annual weeds while many of the pea-flowered species so common along roadsides are present in abundance. Prominent among these is the W.A. Blue Lupin (*Lupinus varius*) which is spreading rapidly along Forrest Drive. Double Gee (*Emex australis*) and Sorrel (*Rumex acetosella*) although not common are most undesirable aliens, while the many species of weeds belonging to the Turnip family and the Daisy family are capable of very rapid spread because of their capacity for enormous seed production.

SUMMARY

The native flora of King's Park consists of over 200 species. Some of these are already rare in the metropolitan area, and all will become scarcer as the City of Perth extends outwards. The plant population of King's Park alone remains inviolate from the depredations of factory and home-builders and will persist as a yardstick by which future measurements may be made. It ill behoves the people of Western Australia to destroy this heritage.

4. BIRDS

Next to the flora it is the birds of the Park which exercise a popular appeal, the other types of animals requiring some specialist knowledge before their interest can be appreciated. Ornithologists have recorded 64 species of birds seen in the Park, though only about half of these are regular inhabitants of the Park (resident species or seasonal migrants). The remainder are occasional visitors and are sometimes quite abundant. Bird-watchers from overseas or interstate frequently visit the Park whilst their ship is in port, to observe species which they would not encounter otherwise. It is not uncommon for bird-loving tourists from the eastern states to visit the Park from their city hotels or guest-houses in the early morning (the best period to watch birds) and enjoy a ramble in the bush areas before breakfast.

Though the composition of the Park birds has altered somewhat in the course of time their variety and abundance seems to have improved rather than otherwise in the last quarter of a century. During a 10-year period from 1928-1937 an observer kept detailed records of birds identified on a 30-minute walk along the 1½ miles route from the pine plantation (opposite Onslow Road, Subiaco) to near the corner of Park Road and Winthrop Avenue, Crawley. He logged an average of 12 species per visit during the summer and 14 in the winter. The same observer repeated the survey during the 10 year period 1946-1955 and found a slight increase in the number of birds seen; the summer average had risen to 13 birds per visit and the winter average to 15 birds. The averages are based on nearly 90 traverses (for details see Serventy, 1938, and ms.).

Some birds which used to be seen regularly in the Park no longer visit it. One is the Western Yellow-Robin which was a regu-



Fig. 4.—King's Park, showing nest sites (numbered) and territories (A-I) of Magpie flocks in 1938.

—After H. M. Wilson. 1946.

lar autumn and winter visitor from the Darling Range country; it was last recorded in the Park in 1935. The Scarlet Robin was more frequent in the Park in earlier years than it is now, but it still survives in secluded localities. On the other hand some birds have appeared or become more prevalent. The handsome vivid green Twentyeight Parrot is now frequently met with, though before 1953 its visits were only occasional. In 1956 the melodious songster, the Western Shrike-Thrush, was first recorded in the bush near the University. It was probably an inhabitant of the Park in the early days and it is hoped that it may again become a permanent resident. Those lovers of dense cover, the Blue Wrens, have not been seen in the Park, but they used to nest in the bush at Crawley many years ago. If the habitat is allowed to revert to "natural untidiness" they may yet colonise (or rather re-colonise) the Park. In 1946 a pair of Splendid Blue Wrens appeared in the shrubberies at the University, Crawley and nested there; however, the whole party disappeared soon after.

Unlike the city parks in the eastern states' capitals the King's Park birds are mostly indigenous species. The only introduced birds are the Kookaburra (introduced from south-eastern Australia), the two turtledoves and the Goldfinch.

Possibly the most conspicuous bird in the Park is the Western Magpie, of which a survey in 1938 showed there was a population of 84 individuals, split up into nine territorial groups or flocks (Wilson, 1946). Wilson's map is reproduced as Fig. 4. Many Magpies become quite familiar around the tea rooms and where people picnic in the open, and have learnt to accept food from visitors. Other species which impress themselves on even the casual observer, mainly by their songs and calls, are the Grey Butcher-bird, the Rufous Whistler (one of Australia's famed songsters), and, among the small birds, the elfin-voiced Western Warbler.

As a group perhaps the most outstanding birds are the honeyeaters, and the profusion of blossom in the Park ensures a strong population. The most numerous are the large Red Wattle-bird (a favourite host of the Pallid Cuckoo, common in the Park through the winter and spring) and the graceful Spinebill Honeyeater. The honeyeaters may be seen probing the large robust flower heads of the Banksias and other plants. Few sights are more pleasing to a patient observer in a quiet part of the bush than the hummingbird-like Spinebill elegantly probing the dainty blossom of the Native Wistaria (*Hardenbergia*), or poised on the stem of a Kangaroo Paw, with its fine curved beak inserted into these bizarre flowers.

Some birds can be seen flying over or soaring above the Park, such as the Cormorants and the Pelican. Occasionally when flying ants are swarming, flocks of Silver Gulls disperse from the river to prey on them. No doubt other river birds, not mentioned in the list which follows, may at times be seen in transit over the Park en route to such havens as Pelican Point.

Some critics have complained that birds are not evident in the Park. That may be true when visits are made in the middle

of the day, particularly when the weather is hot. Birds are most active in the mornings and again in the late afternoon.

The nocturnal birds do not lack interest. Towards dusk one may not infrequently come on Boobook Owls astir. But these birds are more often heard than seen. After August each year the haunting "more-pork" call, most characteristic of Australian bush sounds at night, may be regularly heard. The Tawny Frogmouth, often considered by country people to be responsible for the "more pork" note, is abundant in the Park and motorists at night may sometimes see it on the road or at the verges hunting for insects and other prey (see Serventy, 1936, for an account of investigations on its feeding habits carried out in the Park).

The following 64 species of birds have been recorded within the boundaries of the Park. Those marked with an asterisk are permanent breeding residents or regular seasonal visitors. The remainder are visitors of varying order of frequency; some (such as the Rainbow-bird and the Whistling Eagle) even nest in the Park occasionally.

Quails:

Stubble Quail (*Coturnix pectoralis*); Painted Quail (*Turnix varia*).

Doves:

*Indian Dove (*Streptopelia chinensis*); *Senegal Dove (*Streptopelia senegalensis*).

Cormorants and Pelicans:

Black Cormorant (*Phalacrocorax carbo*); Little Black Cormorant (*Phalacrocorax sulcirostris*); Australian Pelican (*Pelecanus conspicillatus*).

Gulls and Plovers:

Silver Gull (*Larus novae-hollandiae*); Banded Plover (*Zonifer tricolor*).

Hawks:

*Australian Goshawk (*Accipiter fasciatus*); Collared Sparrowhawk (*Accipiter cirrocephalus*); Whistling Eagle (*Haliastur sphenurus*); Little Falcon (*Falco longipennis*); Brown Hawk (*Falco berigora*); Kestrel (*Falco tinnunculus*).

Owls:

*Boobook Owl (*Ninox novae-zeelandiae*).

Parrots and Cockatoos:

Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*); White-tailed Black Cockatoo (*Calyptorhynchus baudinii*); Smoker (*Polytelis anthopeplus*); Western Rosella (*Platycercus icterotis*); King Parrot (*Purpureicephalus spurius*); *Twentyeight Parrot (*Barnardius zonarius*).

Piearrian birds:

*Tawny Frogmouth (*Podargus strigoides*); *Kookaburra (*Dacelo gigas*); *Sacred Kingfisher (*Halcyon sancta*); Rainbow-birds (*Merops ornatus*).

Swifts:

Fork-tailed Swift (*Micropus pacificus*).

Cuckoos:

- *Pallid Cuckoo (*Cuculus pallidus*); Fan-tailed Cuckoo (*Caeomantis pyrrhophanus*); Narrow-billed Bronze Cuckoo (*Chalcites basalis*); *Golden Bronze Cuckoo (*Chalcites lucidus*).

Swallows and Martins:

- Welcome Swallow (*Hirundo neoxena*); *Tree Martin (*Hylochelidon nigricans*).

Flycatchers and Robins:

- *Grey Fantail (*Rhipidura fuliginosa*); *Willie Wagtail (*Rhipidura leucophrys*); *Scarlet Robin (*Petroica multicolor*); Western Yellow Robin (*Eopsaltria griseogularis*).

Whistlers and Shrike-Thrushes:

- *Golden Whistler (*Pachycephala pectoralis*); *Rufous Whistler (*Pachycephala rufiventris*); Western Shrike-Thrush (*Coluricincla rufiventris*).

Magpie Larks:

- Magpie Lark (*Grallina cyanoleuca*).

Cuckoo-Shrikes:

- *Black-faced Cuckoo-Shrike (*Coraeina novae-hollandiae*)

Chats:

- White-fronted Chat (*Epthianura albifrons*).

Warblers:

- *Western Warbler (*Gerygone fusca*); *Weebill (*Smicromis brevirostris*); *Western Thornbill (*Acanthiza inornata*); *Brown Thornbill (*Acanthiza pusilla*); *Yellow-tailed Thornbill (*Acanthiza erythrorhoa*).

Wood-Swallows:

- Dusky Wood-Swallow (*Artamus cyanopterus*)

Nuthatches:

- Black-capped Sittella (*Neositta pileata*).

Flower-peekers:

- *Mistletoe-bird (*Dieacum hirundinaeum*); Spotted Diamond-bird (*Pardalotus punctatus*); *Red-tipped Diamond-bird (*Pardalotus substriatus*).

Silver-eyes:

- *Western Silvereye (*Zosterops australasiae*).

Honeyeaters:

- *Spinebill (*Acanthorhynchus superciliosus*); *Brown Honey-eater (*Glieiphila indistincta*); *Singing Honeyeater (*Meliphaga virens*); Yellow-plumed Honeyeater (*Meliphaga ornata*); *Red Wattle-bird (*Anthochaera carunculata*); Little Wattle-bird (*Anthochaera erythroptera*).

Finches:

- Goldfinch (*Carduelis carduelis*).

Crows:

- *Australian Raven (*Corvus coronoides*).

Australian Magpies:

- *Grey Butcher-bird (*Craetetus torquatus*); *Western Magpie (*Gymnorhina dorsalis*).

5. THE INCONSPICUOUS FAUNA

Except for the birds the animals found in the Park are not conspicuous and, although the great majority of people may gaze on them as curiosities when they are accidentally discovered, they are rarely regarded as aesthetically pleasing. Thus the lizards and snakes, frogs and snails, spiders, scorpions, centipedes and hosts of insects have no one among the public to plead their case and exclaim on their beauty as do the birds and flowers. Much of this fauna will never have any appeal to "the man in the street" who is unlikely to be interested in the fact that certain forms of a species of native snail (*Bothriembryon melo* (= *bullia*)), distinguished in body colour and shell shape and marking, are restricted to the coarse or fine-grained sands, or that various species of centipede are probably also restricted in a similar manner, or that King's Park is the type locality of a trap-door spider, *Aganippe raphiduca*.

However, if "the man in the street" wants to view a healthy parkland, then although he may not be interested in the small animals they nevertheless play an essential and irreplaceable part in plant nutrition by circulating and aiding in the decomposition of leaves to humus and organic material which plants need to grow. This microfauna lives among the rotting leaves and the sand grains of the soil. In any square yard of soil their numbers are astronomical, yet in summer fires their numbers are reduced to insignificant proportions and they have to be led back to their former abundance through innumerable successional stages. In the meantime plant growth is hindered because humus and moulds are not being formed at the rate required by the vegetation. Thus the plant succession is slowed to the detriment of the re-establishing woodland.

6. THE PROBLEMS

In an earlier paragraph reference was made to the underlying significance of the two floral assemblages dominated by Tuart and Jarrah, respectively. It will be recalled that Tuart occurs on the old dunes. However, if we go to a beach dune which is in process of formation at the present time no Tuarts or other plants characteristic of the Tuart associations are to be found. The stages by which the vegetation of beach dunes is gradually replaced until Tuart grows is known in Ecology as "succession" and the Tuart association is called the "climax" vegetation, i.e., the end of the succession (see Smith, *W. Austr. Nat.*, 6: 1). In King's Park Tuart and Jarrah both represent climax phases of the vegetation,

If the climate does not change and there is no interference by fire, other catastrophes, or man, then the climax persists indefinitely. However, this rarely happens, and in the Perth area timber-getting, grazing, burning, etc., have all interfered with the climax vegetation. Let us consider briefly the effect of some of these disturbances.

The climax vegetation in a woodland may be characterised by the cover and shelter given by the shrubs and trees. The leaves of the tall trees form a canopy casting shadows and shading both

the ground and the plants beneath them. These shrubs, and small trees are known as the under-story and are common or rare depending on the thickness of the canopy and whether they prefer sunny or shady conditions. Beneath the under-story, and in sun or shade according to preference, are abundant low herbs and shrubs which once again, but this time more intimately, shelter the soil from the intense rays of the sun. Sometimes the natural canopy is so complete and the shade so dense, as under Sheoak (*Casuarina Fraseriana*) that nothing grows and the ground has no cover save the fallen branchlets of the Sheoak. Nevertheless, under what we might term normal climax conditions there are a series of elements; the canopy of the trees, the under-story, the shrubs, and finally the fallen leaves, which protect the soil from exposure (heat and drying) by the sun and wind. If the foregoing is kept in mind then it is possible to foretell some of the consequences of interference.

What will happen to the flora depends on three factors: (a) The amount of plant destruction involved; this will determine the exposure of the soil and young growing plants to sun and wind. (b) The amount of destruction which has gone on in the soil structure, i.e., whether the humus layers are still intact or whether burnt or turned under. (c) The amount of tolerance plants have to exposure to sun, wind, high soil temperatures and soil disturbed as in (b) above.

When any factor injurious to the climax vegetation destroys in whole or part the plants typical of the climax the association then regresses to a plant assemblage composed of hardy species which can withstand the rigorous conditions imposed by absence of shade, leaf litter or even soil humus which is consequential to the destruction. If other conditions such as weather and climate remain unchanged, or if the catastrophe which caused the original destruction is not repeated at too frequent an interval, there will be a succession leading to the re-establishment of the old climax vegetation association.

In King's Park habitat destruction usually takes the following forms:—

i. **Fires.** The devastating effect of fires is only too apparent each summer in unsightly blackened areas and trees stripped of foliage. Equally apparent is the rapid, vigorous and healthy regrowth of many species, and more profuse flowering. This rapid regeneration after burning, characteristic of most of the Australian bush (cf. C. A. Gardner, *W. Austr. Nat.*, 5: 166), leads to lack of awareness of the long term damage which can result from repeated burning. The problem is complex and the many aspects can not be treated adequately in a short note.

One of the worst aspects is the permanent damage to trees. There are few trees in the park which do not bear the scars of fire, shown in hollowed trunks, deformed branching, and poor and irregular canopy. Tall straight young Eucalypts which should be replacing the older trees are almost non-existent. Banksias suffer less because of their thick, hard, fire-resistant bark. Casuarinas

are relatively thin barked, to which the very severe damage to trunks bears witness.

The policy of the Park authorities has been to put through controlled burns every few years in early summer to reduce the fire-hazard in late summer. Ideally, these are made on humid days with no wind at a time when the soil and humus are damp. With a carefully controlled burn the canopy is untouched and there is a minimum destruction of the organic matter in the soil. Shrubs such as *Daviesia* and *Oxylobium* and *Hibbertia* make good regrowth while there is still moisture in the soil. There can be no doubt that these do far less damage than severe fires in late summer when the bush is tinder-dry (such as the fire which went up the cliffs to Forrest Drive in March, 1957). After a late summer burn there is little shrub regrowth until the following spring. Reduced shrub competition together with the opened up canopy and bare ground gives the Veld grass and other weeds a clear run with the winter rains.

This invasion of burnt areas by Veld grass and annual weeds is another very serious result of burning and unfortunately even the mildest burn opens up the ground to invaders. Firebreaks cut for the control of fires are in themselves one of the worst enemies of the native bush, in that it is almost invariably from the edges of the firebreaks that the Veld grass invades the bush. This was shown very clearly in a survey made some years ago by the King's Park Board.

The problem of response of native species is different for each



Fig. 5—Undergrowth in Tuart Association, at the high part of Forrest Drive. Saplings of *Banksia grandis* with *Helichrysum cordatum* (white stems) and *Trichinium alopecuroideum*, *Eremophila glabra* in the left background. The absence of Veld grass here is discussed on p. 47.

—Photo A. M. Baird, October, 1955.

species—a few examples can be cited. Herbaceous perennials and annuals benefit from the reduced competition and the additional mineral supplied through the ash. It is well known that many orchids flower better after a fire and *Burchardia* is conspicuous particularly after late summer fires. Blackboys and *Zamia* palms are the first species to grow after the burn, both have protected stem apices and a food store in the thick stems. Shrub species with massive underground rootstocks such as *Persoonia*, *Daviesia*, *Oxylobium* are extremely fire-tolerant—in fact are rejuvenated by the removal of old, dead and diseased shoots. *Stirlingia*, where present, makes amazing growth after a burn. It dominates the area with its flowering stems the first season and then sinks into non-flowering obscurity. Species which regenerate less strongly, e.g., *Pimelea spectabilis* and *Hovea*, require long intervals between burns to survive. *Pimelea rosca* (Fig. 3) is killed by fires but seedlings can be abundant and if given time will reach flowering maturity. All species which depend on regeneration from seed can be eliminated by too frequent fires. Those in which seedlings are numerous, such as the prickly *Acacia* (*Acacia pulchella*) are still abundant in the park; others in which seedlings are few are becoming extinct. For example: *Leucopogon racemulosum*, a handsome white heath of which so little remains that few people know it; *Calythrix Fraseri*, a tall pink-flowered species which persists only in a few patches which have escaped fires. Two yellow species of *Calythrix* have almost if not completely disappeared. The handsome *Cryptandra arbutiflora* and *Eremophila glabra* are gradually being eliminated—both are common in the small area of which a part is shown in Fig. 5. This area has somehow escaped fire for many years and is remarkably free from Veld grass although within a badly infested region—an indication that the native bush if untouched by fire or clearing can resist the inroads of Veld grass even where, as here, the tree canopy is open.

More difficult to evaluate without detailed work on the subject is the progressive deterioration of the soil as a result of repeated fires. Evidence for this seems clear at least in parts of the University grounds which have been burnt about every alternate year.

Fire control measures in the Park, it is clear, require modification. The controlled burning is over-zealous and the firebreaks have accelerated the spread of Veld grass. Many disastrous fires are caused by irresponsible persons throwing cigarette butts from passing cars, and Mounts Bay Road is a particularly dangerous hazard. The verges of this and other boundary roads, and the park drives, should be kept neatly turfed. Some attention might be paid also to growing succulents, such as *Carpobrotus*, on the cliff edges in Mount's Bay Road as a further protection from such fires.

ii. Removal of dead, unsightly, decaying or diseased trees in an effort to keep the woodland "tidy." Normally trees die, rot or are eaten by termites; their removal from the site deletes a minor habitat frequented by many animals and impoverishes the soil by preventing the return of organic and mineral matter. However,

this is not the important element in the habitat destruction. Entry of the machinery to fell and remove the offending tree leads to restricted but nevertheless serious disturbance of the habitat by flattening shrubs and herbs in the wheel tracks of vehicles and around the fallen tree. But more important is disturbance to the soil. The humus layer is broken by wheels, boots and falling boughs, and small areas of subsoil are brought to the surface. Further, the position is aggravated by foliage and branches being burnt *in situ*, thus creating more "bald patches" in the bush. These are situations to which the native flora is poorly adapted. Recovery after fire has been an age-long occurrence but invasion of the freshly turned soil is something new and the ubiquitous exotic weeds soon establish themselves. If no further destruction occurs the exotic and native flora reach a truce and over a prolonged period there is little doubt that the native flora will replace the invaders, for it is adapted to living in an established woodland with a characteristic canopy, under-story and shrub layer. The intruding weeds, however, prefer open exposed conditions with little shelter.

The capacity of the native vegetation to colonise even extensive exposures of sub-soil is well shown along the verges of the Park in Thomas Street where in the early 1930s uncompleted road works left large areas of yellow sand which are now vegetated by native plants dominated by *Banksia prionotes* and *Hakea*. Nevertheless, even this success of the native flora gives a warning; it has taken 25 years and the climax has not been reached!

However, should habitat destruction continue before the complete victory of the native plants, then the weeds with their faster rates of growth and more abundant seed setting will extend from their bridgehead and commence an invasion of other woodland, where the soil has been mechanically disturbed.

Some further remarks may not be out of place in this section on the Board's policy of removing and selling for firewood, old, dying and what are considered as unsightly trees. It is impossible to justify such practices from an ecological standpoint, quite apart from the dangers incurred by mechanically disturbing the soil in the process.

A problem, in many ways similar to that posed by King's Park, arose a few years ago in England, where an estate was bequeathed to a University as a field teaching site for forestry and animal ecology. The forestry authority desired to manage the estate as a woodland and removed all fallen timber and dead, dying and "unhealthy" trees. The ecologists, on the other hand, pointed out that such management held the estate in a sub-climax and while the forestry policy was continued normal plant and animal succession was prevented from reaching a climax. In any case the selective removal of part of the environment could only have the effect of unbalancing the composition of the plant and animal communities. It is well known, for instance, that some birds find their subsistence mainly in this ecological niche of fallen and dead trees. After a short period of management of the English site it became apparent that pests were more frequent, and under-

shrubs were dominating the regrowth of the forest trees. It was not possible to replace the dead and fallen timber which had been removed, but the lesson was obvious, that is, while the "unsightly" dead timber had been present the woodland had been regenerating and healthy. As soon as it was removed the biological control was upset and the woodland lost its healthy character. Clearly, tidiness is not one of Nature's concepts. The balance of Nature requires that growth and death both contribute to the well-being of the community.

iii. **Tracks and pathways.** A scrutiny of aerial maps of the park (c.g., the Tourist Department pamphlet on the Park, 1950, and the Perth City Council's brochure on the Aquatic Centre, 1957) reveals the excessive network of roadways and tracks intersecting the park, and the many minor paths are not shown. The destruction of trees and shrubs involved in the making of these miles of thoroughfare has been too great for a park of this size, and it has created multiple "edge effects" resulting in weed infestation throughout the area. Some of these tracks should be allowed to revert to bush and those permitted for pedestrian and other traffic should be kept as narrow as possible, with the surface bituminised. Their edges should be treated with weedicides or by other means to control plant pests. The public should not, of course, be restricted to the use of these pathways. Wandering over the bush will do no harm though most people will find it more convenient to keep to the paths. The prevention of unauthorised parking or driving of vehicles in the bush areas should be more active than is the case at present.

iv. **Tree Planting.** Trees have been planted on a wholesale scale in the peripheral bushland surrounding May and Forrest Drives. In each case there has been an extensive disturbance of the soil in the immediate vicinity, providing innumerable foci for the introduction of Veld grass and other weeds. In many cases the trees are not endemic species at all, though native to other distant parts of the State. Such non-endemic trees have their place in cultivated parts of the park but are a discordant element in the bushland proper. The botanist winces at the anomaly of seeing Illyarrie (*Eucalyptus erythrocorys*—native to the Three Springs area) or the Coral Gum (*Euc. torquata*, from the Coolgardie-Kalgoorlie district) in a Jarrah-Banksia woodland, and the artist with his or her fine sense of the balanced harmony of the Australian bush feels that something is wrong. These misplaced natives, however lovely they are in their natural environment, or in an arboretum, are as incongruous in the bush portions of King's Park as a top hat would be on a person wearing a bathing suit.

The Veld Grass Problem. It is mainly following the habitat destruction factors ii. to iv. discussed above, rather than after fire, that the exotic Veld grass (*Ehrharta*) enters the woodland. Once established it is an active invader of all disturbed habitats. However, for successful growth it needs an open canopy. It does not succeed in the closed canopy so often seen in Jarrah woodland. When the grass first appeared in the Park is unknown. It was first noticed

in the State at East Guildford about 1900 and was recorded at the Crawley end of King's Park in 1924, by which time there was a dense growth of it there of about a quarter of an acre in extent (W. Catton Grasby, *Western Mail*, May 14, 1925). The grass was then hailed as a valuable fodder grass and the then Superintendent of the Park (J. Heath) was publicising it as such to the Controller of Group Settlements and the Department of Agriculture. At one time he was selling the grass to farmers at £1 a bag.

Its menace to the Park came to be realised and various measures were taken to eradicate it, with little success. One bold step was adopted in 1949 to 1951 when during the flowering and seeding seasons the Board tried to control the grass by means of cattle grazing. This well-meaning attempt appeared to be soundly based because Veld grass cannot stand heavy grazing. However, it failed because native vegetation was also eaten, ungerminated seeds of Veld grass and other weeds were left, and, most important, the litter and soil layers were broken up by the hooves of the animals which left a multitude of foci from which other weeds could invade.

It seems that it is because of the open nature of the canopy and the absence of aggressive native grasses that Veld grass has been so successful in the Tuart association. Nevertheless it only invaded this environment by way of the disturbed ground. Perhaps we may have to come to terms with this grass in the Tuart association and simply tolerate its presence. It is useless to pull it out for the disturbed area only offers another focus for entry of the same or other weed species. Yet since it appears to require absence of overhead cover it may be worthwhile actively to combat the grass by dense seeding (in the heavily disturbed areas) of some of the rapidly-growing native plants endemic to the Park. Three which come to mind and which naturally form dense stands early in the normal succession are *Dryandra floribunda*, *Acacia pulchella* and *Adenanthos sericea*. Such judicious seeding with endemic plants on areas over-run by Veld grass could be extended to fire-devastated ground, firebreaks which it is desired to have revert to bushland, and other "bald patches." This should set the natural ecological succession firmly on the way, naturally leading to the re-establishment of the climax woodland, either the Tuart or the Jarrah association. It is emphasised that seeding, not planting, of endemic shrubs is advocated, as planting further disturbs the ground and thus encourages the entry of exotic weeds.

Certainly nothing like the controlled seeding suggested above has been attempted here before, yet this should not prevent the implementation of a positive policy. As it is known that elsewhere, under disturbed conditions, *Dryandra floribunda* and *Acacia pulchella* do form dense stands early in the succession and lead to successful restoration of the climax it is therefore possible that heavy seeding with these shrubs in badly devastated areas may lead to exclusion of exotics and the regeneration from seed of the floral components of the climax. The Park must be treated as the totality of living things within it. Some are young and growing,

others old and dying; it should be the aim of the management to balance these things and then have a dynamic healthy near-natural park.

7. DISCUSSION AND CONCLUSIONS

The King's Park Board after a couple of decades of its "management" policies is now informed by various critics of its results that the bush parts of the Park are in a "disgraceful condition" (according to the Minister for Lands, the Hon. E. K. Hoar, in Parliament on November 25, 1954), that it is "a decaying bush area" (the Lord Mayor, Mr. Howard, in his official brochure), that the portion proposed for the aquatic centre is "an unlovely piece of ground" (*West Australian*, in an editorial on July 25, 1957), and that the whole of it is "1,000 acres of degenerating bushland" (P. D. Jeans, *West Australian*, July 31, 1957). All this is very unflattering to the capabilities of the Board members, who to add to their bewilderment heard the Minister for Lands, when he made the above-mentioned diatribe, refer to "the really splendid service being given to the public by the King's Park Board," and "I would swear that up till now nobody has had any reason to complain of the activities of the Board." The depreciations quoted are far too sweeping and as generalisations cannot be regarded as true. Some of them may reflect, as stated on p. 30, an overseas upbringing. However, there is no doubt that in several important respects the Board's management policies have left serious scars on the Park and which arouse legitimate complaint.

If the Board members tour "unmanaged" pockets of bushland around the metropolitan area (as for instance between Jolimont and Karrakatta, west of the railway) or inspect uncleared vacant building lots even in the nearer suburbs, they may have the mortification of seeing native bush in better heart than in the Park they control. On reflection, therefore, the Board may come to agree with the opinion of an American ecologist who wrote on the national parks of that continent, preserved in the natural or wilderness condition, that the best way of managing such parks is to leave them alone!

There can be no doubt that fundamentally this is so, but it is one of the hardest things in the world for an active conscientious official to realise this. He constantly attempts to do something "positive" in the execution of his duties to justify his salary and satisfy his conscience. So any park controlled by a zealous executive who is not well informed ecologically, may be beset by an increasing spiral of management problems. The simple solution is to let the park recover naturally. There are many instances in Australia where land cleared and cultivated, and even partly urbanised, being abandoned for years, has reverted almost entirely to its old state. The verges of King's Park itself, as already mentioned, show strong indications of this happening despite the fact that the strips are in many places continually being disturbed.

However, the public naturally desire a more rapid improvement in the Park; nature to be helped in its restoration, as it were. We have in the preceding section discussed the problems which a management policy must face in attempting such recoveries, and offered some suggestions how to deal with them. There is no existing body of written knowledge which will tell the Board clearly and in detail how to bring the desire for a natural park to an early and successful fruition. Any horticulturist can say from his own experience, or from reading, how to grow a lawn or a bed of roses but none can say with equal precision how to restore a piece of damaged native woodland and then maintain it indefinitely in natural or near-natural form. This should not deter the Board from trying. The attempt offers an unrivalled opportunity to show the way to a new and exciting prospect of living with, rather than attacking and subduing our environment.

To attain this there seems no alternative than to reconstitute the Board. It is not sufficient to call for occasional advice from outside specialists. The Board should itself be comprised of knowledgeable persons with an understanding of modern conservation principles, and, above all, with a sympathy and firm belief in the worthwhileness of the objective. Board members and officers who have lost heart and view the future despondently have tacitly admitted defeat in their past efforts and should retire.

The Park will always mean many things to the people of the State. It is a place of fine views, magnificent panoramas, pleasant lawns, an imposing War Memorial and unique memorial avenues. It is proper that we should be proud of these things. Yet to many there is more in the Park, and to them the natural bushland is the core and heart of its attraction. Some are regular visitors, finding solace and relaxation in this place of quiet peace. More make an annual pilgrimage in the winter and spring to revel in the wild-flowers for which it is famous. If the pattern of urbanisation here follows the pattern of other young countries then we may expect, as the pioneering generations recede into history, to find an increasing awareness of the charms of the native environment. The Park, surviving as an indigenous park, an oasis amidst an ever-widening area of suburban and other development, will have an increasing number of devotees.

The importance of a study of history and the preservation of historical relics is to give a sense of continuity to life. Our bushland Park can be regarded as an important historical relic, since it links us with the scene as observed by the pioneers on their arrival. Many prominent figures in our history have been associated with its creation and development. A young country has too few evidences of continuity to destroy them, except under the stress of pressing need. It is hoped that the people of Western Australia at the present time, by defending the Park from attack, will be able to show the foresight and statesmanship of those who in the past created King's Park.

It is to this aim that the Western Australian Naturalists' Club dedicates this article.

A SELECTED BIBLIOGRAPHY ON THE NATURAL HISTORY OF KING'S PARK

- AUDAS, J. W. 1926. The King's Park, Perth. *Vict. Nat.*, 43: 236-239 [an account of the flora].
- GENTILLI, J. 1953. Amanitas from King's Park. *W. Austr. Nat.*, 4 (2): 25-34; 4 (3): 59-63.
- LIPFERT, O. H. 1937. Notes on the Birds of Crawley, Perth, in the Early Nineties. *Emu*, 37 (2): 133-134.
- MAIN, A. R., and M. A. CARRIGY. 1953. Native Snails of the Genus *Bothriembryon* in King's Park, Perth. *W. Austr. Nat.*, 4 (3): 49-59.
- McINTOSH, D. L. 1957. Western Shrike-Thrush at Nedlands. *W. Austr. Nat.*, 5 (8): 231.
- PELLOE, E. H. 1921. *Wildflowers of Western Australia*, Melbourne [frequent references to King's Park].
- SERVENTY, D. L. 1936. Feeding Methods of *Podargus* with Remarks on the Possible Causes of its Aberrant Habits. *Emu*, 36 (2): 74-90.
- SERVENTY, D. L. 1938. The Relative Abundance of Birds Illustrated with Reference to King's Park, Perth. *Emu*, 37 (4): 269-273.
- SERVENTY, W. R. 1950. Smoker Parrots in King's Park. *W. Austr. Nat.*, 2 (7): 166.
- WILSON, H. M. 1946. The Life History of the Western Magpie. *Emu*, 45 (3): 233-244; 45 (4): 271-286.

RECENT CAPTURE OF THE QUOKKA (*SETONIX BRACHYURUS*) ON THE MAINLAND

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In the *West Australian* of April 17, 1957, an article by Dr. E. P. Hodgkin discussed work carried out on the Rottnest I. population of the Quokka by the University Zoology Department. The suggestion was made that the Quokka had become extinct on the mainland during the early 1930s.

Later in the month Mr. H. A. C. Atkinson, of Bibra Lake, after reading the article, informed the C.S.I.R.O. Regional Laboratory that he knew of a mainland population of the Quokka. The message was passed on to the Zoology Department. As a result a party consisting of H. Atkinson, A. Main, D. Serventy, J. Ford, R. Sadleir and S. Barker visited a forestry area 5 miles S.E. of Byford on May 4. Mr. Atkinson knew the area intimately as he had lived there for many years. Five swamps were inspected and abundant evidence of Quokka presence was found, such as tracks, droppings and tunnels in the thick undergrowth. In some cases it was possible to measure the foot imprints in the tunnels; these conformed to the known foot length of the Quokka.

A trapping programme was initiated by the authors on May 8 and continued until June 6. The traps were standard design by G. B. Sharman and successfully used for capture of Quokkas on Rottnest and Bald Islands. The bait used was apple and bread crust.

The trapping sites were the swampy headwaters of the following streams:—Wongong Brook (area 1); Manjedal Brook